

# INTRODUCTION

---

The Santa Clara Valley Water District (District) has jurisdiction over 530 miles of unmodified natural waterways, 150 miles of artificial channels and culverts, and 10 reservoirs of sizes ranging from 400 to 90,000 acre-feet. These facilities spread over an area of 1300 square miles, much of it urbanized into industrial and residential zones, but a portion remains as agricultural or undisturbed lands. Management of these facilities involves both long-term capital improvement projects and regular maintenance activities.

As mandated in the Ends policies of the Board of Directors, the District is to reduce the potential for flood damage, and to protect, enhance or restore the watershed, streams and the natural resources of the Santa Clara Valley. To achieve these goals, the District staff should understand the watersheds of the Valley, provide environmentally friendly designs for flood protection, stabilize the creeks considering various degrees of urbanization, and enhance the natural habitats whenever possible. Engineering-wise, these tasks require the technical knowledge of hydrology, hydraulics, fluvial geomorphology, and sediment transport. Except for hydrology, which is covered separately, the other subjects are included in this design manual. Also included are the procedures for engineering analyses and design.

The manual is divided into two sections. Section 1 provides procedures for design and engineering analyses involved in understanding and managing our creeks. It contains six chapters. Chapter 1 provides procedures for geomorphic assessment of creek systems. Chapter 2 provides procedures for a stable channel design. Chapter 3 describes grade control structure designs. Chapter 4 describes the channel bank stabilization methods. Chapter 5 provides design procedures for miscellaneous hydraulic structures including rock riprap, detention basin, outlet structures, and channel transitions. Chapter 6 provides designs for fish passage structures.

Section 2, containing Chapters 7 to 10, provides the basic principles, theories and analytical formulae. The contents of these three chapters were selected to cover the engineering needs of the District. They were also tailored to the local environments, which include urbanized watersheds and intermittent creek flows. Chapter 7 is dedicated to open channel hydraulics; Chapters 8 sediment transport; and Chapter 9 the fundamentals of fluvial geomorphology. Chapter 10 provides fundamentals of sediment transport analyses.

Because the District jurisdiction covers a wide range of hydraulic engineering subjects, there is bound to be information that has been inadvertently left out from this manual. The user is encouraged to contact the Hydraulic Engineering Unit Manager with any feedback or comments on the manual. Subjects such as reservoir hydraulics and reservoir hydraulic structure designs are planned to be added in the future.

The District is greatly indebted to the reviewers who provided valuable comments to this document. They include Prof. Chester Watson of Colorado State University, Mr. Paul Amato, et al. at the San Francisco Bay Regional Water Quality Control Board, Mr. George Heise of the California Department of Fish and Game, Mr. Chuck Anderson of Schaaf and Wheeler, Mr. Jeff Haltiner of PWA, and Mr. Larry Johmann of the Santa Clara County Creeks Coalition.